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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/812,754	XU ET AL.
Examiner	Art Unit	
Edward Park	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-48 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-48 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 29 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Objections*

1. **Claims 28, 43, 47** are objected to because of the following informalities: Regarding claims 28, 43, 47, the term "kernel reduction" is not disclosed or given reference to within the specification. It appears "kernel reduction" is a typographical mistake and should be changed to "kernel reduction regression". Appropriate correction is required.

### *Claim Rejections - 35 USC § 101*

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.

When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the

computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O'Reilly, 56 U.S. (15 How.) at 112-14. Moreover, it does not appear that a claim reciting a signal encoded with functional descriptive material falls within any of the categories of patentable subject matter set forth in Sec. 101.

... a signal does not fall within one of the four statutory classes of Sec. 101.

... signal claims are ineligible for patent protection because they do not fall within any of the four statutory classes of Sec. 101.

Nonfunctional descriptive material that does not constitute a statutory process, machine, manufacture or composition of matter and should be rejected under 35 U.S.C. Sec. 101. Certain types of descriptive material, such as music, literature, art, photographs and mere arrangements or compilations of facts or data, without any functional interrelationship is not a process, machine, manufacture or composition of matter. USPTO personnel should be prudent in applying the foregoing guidance. Nonfunctional descriptive material may be claimed in combination with other functional descriptive multi-media material on a computer-readable medium to provide the necessary functional and structural interrelationship to satisfy the requirements of 35 U.S.C. Sec. 101. The presence of the claimed nonfunctional descriptive material is not necessarily determinative of nonstatutory subject matter. For example, a computer that recognizes a particular grouping of musical notes read from memory and upon recognizing that particular sequence, causes another defined series of notes to be played, defines a functional interrelationship among that data and the computing processes performed when utilizing that data, and as such is statutory because it implements a statutory process.

3. **Claims 27-29** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 27-29 define an engine embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed engine can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to

embody the program on “computer-readable medium” or equivalent in order to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

4. **Claims 35-41** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 35-41 are drawn to functional descriptive material recorded on a computer readable medium containing instructions that are executable by a computing device. Normally, the claim would be statutory. However, the specification, at page 8 defines the claimed computer readable medium as encompassing statutory media such as a “ROM”, “hard drive”, “optical drive”, etc, modulated data signal such as a carrier wave as well as **non-statutory** subject matter such as a “signal”.

A “signal” embodying functional descriptive material is neither a process nor a product (i.e., a tangible “thing”) and therefore does not fall within one of the four statutory classes of § 101. Rather, “signal” is a form of energy, in the absence of any physical structure or tangible material.

Because the full scope of the claim as properly read in light of the disclosure encompasses non-statutory subject matter, the claim as a whole is non-statutory. The examiner suggests amending the claim to include the disclosed tangible computer readable media, while at the same time excluding the intangible media such as signals, carrier waves, modulated data signal, etc. Any amendment to the claim should be commensurate with its corresponding disclosure.

5. **Claims 42-44** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claims 42-44 recites a database which does not

impart functionality to a computer or computing device, and is thus considered nonfunctional descriptive material. Such nonfunctional descriptive material, in the absence of a functional interrelationship with a computer, does not constitute a statutory process, machine, manufacture or composition of matter and is thus non-statutory *per se*.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. **Claims 1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 17, 19, 20-24, 26, 27, 29, 35, 36, 37, 38, 39, 42, 45, 46, 48** are rejected under 35 U.S.C. 102(b) as being anticipated by Liang et al (IEEE, “Example-based Caricature Generation with Exaggeration”).

Regarding **claim 1**, Liang teaches a method, comprising:

creating a drawing of a facial image (Liang: figure 3);  
comparing relationships among facial features in the drawing to corresponding relationships in facial images and associated caricatures (Liang: figure 4); and  
automatically exaggerating at least one relationship among facial features in the drawing based on the comparing (Liang: section 4).

Regarding **claim 5**, Liang teaches constraining the automatic exaggerating of a relationship among facial features to maintain the facial image within a range of probable faces (Liang: section 4).

Regarding **claim 6**, Liang teaches wherein the constraining is based on a likelihood that the exaggerating conforms to allowable exaggerations in the associated caricatures (Liang: section 4.3).

Regarding **claim 7**, Liang teaches deriving a first map representing differences between the drawing of the facial image and the facial image after the exaggerating (Liang figure 3); deriving a second map representing averaged differences between the facial images and their associated caricatures; and comparing the first map against the second map (Liang: figure 3); adjusting at least some of the differences in the first map to more closely approximate corresponding differences in the second map (Liang: figure 3); and adjusting an exaggerated relationship based on the adjusted first map (Liang: figure 3; section 4).

Regarding **claim 8**, Liang teaches wherein the adjusting at least some of the differences in the first map to more closely approximate corresponding differences in the second map uses a maximum likelihood model (Liang: section 4).

Regarding **claim 9**, Liang teaches deriving a map representing differences between the drawing of the facial image and the facial image after the exaggerating (Liang: figure 3); selecting one of the associated caricatures based on a similarity to the map (Liang: section 4); and conforming the exaggerating to the selected caricature (Liang: figure 3), wherein if exaggeration of a relationship varies beyond a threshold from a corresponding relationship in the selected caricature, then a degree of the exaggerating is altered to conform the relationship to the selected caricature (Liang: section 4).

Regarding **claim 10**, Liang teaches wherein the selecting uses a maximum likelihood technique (Liang: section 4).

Regarding **claim 11**, Liang teaches variably combining the drawing of the facial image with the selected caricature in order to produce a variably exaggerated caricature of the facial image (Liang: section 4).

Regarding **claim 12**, Liang teaches selecting a relationship among facial features to exaggerate based on a variance of the relationship from a norm derived from the facial images in the database, wherein relationships having relatively high variance from the norm are selected for exaggeration (Liang: section 4.2).

Regarding **claim 13**, Liang teaches measuring one or more distances representing the relationship among facial features; and comparing the one or more distances with corresponding average distances in the facial images (Liang: section 3.2).

Regarding **claim 16**, Liang teaches measuring one or more distances representing the relationship among facial features (Liang: section 3.2); assigning weights to the facial images based on a similarity of the relationship to corresponding relationships among facial features in

the facial images, wherein a high weight is assigned to a high similarity (Liang: section 4.4); and selecting the relationship for the exaggerating if one or more distances representing the relationship vary beyond a first threshold from one or more corresponding average distances among facial features derived from the facial images that are assigned a weight that exceeds a second threshold (Liang: section 4.2).

Regarding **claim 17**, Liang teaches varying a degree of the exaggerating to be applied to a relationship among facial features while constraining the exaggerating in order to maintain the facial image within a range of probable faces (Liang: section 3).

Regarding **claim 19**, Liang teaches exaggerating one of a shape and a size of a facial feature (Liang; figure 3).

Regarding **claim 20**, Liang teaches a system, comprising:  
means for rendering a facial image into a drawing (Liang: figure 3);  
means for comparing relationships among facial features in the drawing to corresponding relationships in facial images and associated caricatures (Liang: figure 4); and  
means for exaggerating at least one relationship among facial features in the drawing based on the corresponding relationships in the facial images and associated caricatures (Liang: section 4).

Regarding **claim 21**, Liang teaches constraining the exaggerating to maintain the facial image of the drawing within a range of probable faces (Liang: section 4).

Regarding **claim 22**, Liang teaches deriving a map representing differences between the drawing of the facial image and the facial image after the exaggerating; means for selecting one

of the associated caricatures based on a similarity to the map; and means for conforming the exaggerating to the caricature (Liang: section 4).

Regarding **claim 23**, Liang teaches wherein the means for selecting includes means for performing a maximum likelihood technique (Liang: section 4).

Regarding **claim 24**, Liang teaches variably combining the drawing of the facial image with the selected caricature in order to produce a variably exaggerated caricature of the facial image in the drawing (Liang: section 4).

Regarding **claim 26**, Liang teaches varying a degree of the exaggerating to be applied to a relationship among facial features while constraining the exaggerating in order to maintain the facial image within a range of probable faces (“exaggeration degree”; Liang: section 3.2).

Regarding **claim 27**, Liang teaches a caricature engine, comprising:  
a facial features and relationships locator to receive a facial image and locate a set of facial features and relationships among facial features in the facial image (Liang: figure 3);

an exaggeration engine to compare the facial features and relationships in the facial image to facial features and relationships in a collection of pairs of facial images and associated caricatures in order to determine which of the facial features and relationships to exaggerate in the facial image (Liang: figure 3); and

an exaggeration constraint engine to compare exaggerations applied to the facial image with at least one selected caricature from the associated caricatures in order to conform a degree of the exaggerations to the at least one selected caricature (Liang: figure 3).

Regarding **claim 29**, Liang teaches a variable warping engine to variably combine the facial image with the at least one selected caricature in order to produce a variably exaggerated

caricature of the facial image (Liang: figure 3), while maintaining the variably combined facial image and caricature within a range of probable faces (Liang: section 3).

Regarding **claim 35**, Liang teaches a computer readable medium containing instructions that are executable by a computing device to perform actions (Liang: section 6) comprising:

comparing relationships among facial features in a facial image to corresponding relationships in a collection of facial images and associated caricatures (Liang: figure 3); and  
exaggerating at least one relationship among facial features in the facial image based on the comparing (Liang: figure 3).

Regarding **claim 36**, Liang teaches constrain the exaggerating to maintain the facial image within a range of probable faces (Liang: section 4).

Regarding **claim 37**, Liang teaches derive a map representing differences between the facial image and the facial image after the exaggerating (Liang: figure 3; section 4); select a caricature from the collection based on a similarity to the map (Liang: figure 3); and conform the exaggerating to the caricature, wherein if exaggeration of a relationship varies beyond a threshold from a corresponding relationship in the caricature, then a degree of the exaggerating is altered to conform the relationship to the caricature (Liang: figure 3; section 4).

Regarding **claim 38**, Liang teaches wherein the selecting includes a maximum likelihood technique (Liang: section 4).

Regarding **claim 39**, Liang teaches combine the facial image with the caricature in order to produce a variably exaggerated caricature of the facial image (Liang: section 4).

Regarding **claim 42**, Liang teaches a database, comprising:

representations of at least parts of facial images (Liang: figure 3); and a representation of an associated caricature for each representation of at least part of a facial image (Liang: figure 3).

Regarding **claim 45**, Liang teaches an automated method, comprising:

- collecting pairs of facial images, wherein each pair includes an unexaggerated facial image and a caricature of the unexaggerated facial image (Liang: figure 3);
- receiving a facial drawing to compare with the pairs of facial images (Liang: figure 3);
- iteratively comparing characteristics of the facial drawing with characteristics in the pairs (Liang: figure 3); and
- selecting one of the pairs as a model for variably exaggerating at least part of the facial drawing (Liang: figure 3).

Regarding **claim 46**, Liang teaches wherein the characteristics include relationships among facial features in the facial drawing (Liang: section 6).

Regarding **claim 48**, Liang teaches wherein the iterative comparing constrains the variable exaggeration of a relationship among facial features in the facial drawing to a degree of exaggeration of a corresponding relationship in the model (“exaggeration directions and degrees”; Liang: section 3, 4).

#### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. **Claims 2, 3, 14, 25, 28, 40, 43, 44, 47** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al (IEEE, "Example-based Caricature Generation with Exaggeration") in view of Jaakkola et al (Proceedings of the 1999 Conference on AI and Statistics, "Probabilistic kernel regression models").

Regarding **claim 2**, Liang discloses all elements as mentioned above in claim 1. Liang does not teach wherein the comparing is performed at least in part by a kernel regression technique.

Jaakkola teaches wherein the comparing is performed at least in part by a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to "allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima" (Jaakkola: section 5).

Regarding **claim 3**, Liang teaches assigning various weights to the facial images and associated caricatures based on a similarity to one or more relationships among facial features in the drawing (Liang: section 4.4).

Regarding **claim 14**, Liang discloses all elements as mentioned above in claim 12. Liang further teaches selecting the relationship for exaggeration if the relationship varies by a threshold from an average for the similar relationships (Liang: section 4). Liang does not teach performing

a kernel regression in order to map the relationship to similar relationships among similar facial features in the facial images.

Jaakkola teaches wherein the comparing is performed at least in part by a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Regarding **claim 25**, Liang discloses all elements as mentioned above in claim 20. Liang further teaches assigning various weights to the facial images and associated caricatures based on a similarity to one or more relationships among facial features in the drawing (Liang: section 4.4). Liang does not teach wherein the means for comparing includes means for performing a kernel regression technique.

Jaakkola teaches wherein the means for comparing includes means for performing a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Regarding **claim 28**, Liang discloses all elements as mentioned above in claim 27. Liang teaches to compare the facial features and relationships in the facial image to facial features and relationships in the collection (Liang: figure 3).

Jaakkola teaches applying a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Regarding **claim 40**, Liang discloses all elements as mentioned above in claim 35. Liang further teaches assigning various weights to the facial images and associated caricatures based on a similarity to one or more relationships among facial features in the drawing (Liang: section 4.4). Liang does not teach comparing using a kernel regression technique.

Jaakkola teaches comparing using a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Regarding **claim 43**, Liang discloses all elements as mentioned above in claim 42. Liang further teaches wherein differences between the representations of at least parts of facial images and their associated caricatures are addressable for iterative comparison with features and relationships among features in a drawing of a facial image (Liang: section 4). Liang does not teach a kernel regression technique to achieve the above mentioned method.

Jaakkola teaches the use a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by

Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Regarding **claim 44**, Liang teaches wherein an exaggeration to be applied to at least one of the features and relationships in the drawing is constrainable to a degree of exaggeration between one of the representations of at least part of a facial image in the database and its associated caricature in the database. (Liang: section 3.2).

Regarding **claim 47**, Liang discloses all elements as mentioned above in claim 45. Liang does not teach wherein the iterative comparing uses a kernel reduction technique.

Jaakkola teaches wherein the iterative comparing uses a kernel regression technique (Jaakkola: section 4).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression technique as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

10. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Liang et al (IEEE, “Example-based Caricature Generation with Exaggeration”) with Jaakkola et al (Proceedings of the 1999 Conference on AI and Statistics, “Probabilistic kernel regression models”) and further in view of Taylor et al (US 7,095,878 B1).

Regarding **claim 15**, Liang discloses all elements as mentioned above in claim 12. Liang further teaches assigning weights to the facial images based on a similarity of the relationship to corresponding relationships among facial features in the facial images, wherein a high weight is assigned to a high similarity (Liang: section 4.4). Liang does not teach wherein the selecting a

relationship includes performing a kernel regression in order to map the relationship to similar relationships among similar facial features in the facial images and applying a linear regression to the weighted facial images.

Jaakkola teaches wherein the selecting a relationship includes performing a kernel regression (Jaakkola: section 5).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a kernel regression as suggested by Jaakkola, to “allow greater flexibility in specifying probabilistic regression models of various complexity levels without fear of local minima” (Jaakkola: section 5).

Taylor teaches applying a linear regression (Taylor: col. 11, lines 15-35).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang with Jaakkola combination to utilize a linear regression as suggested by Taylor, to increase the reliability of comparing the relationships between similar facial features.

11. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al (IEEE, “Example-based Caricature Generation with Exaggeration”) in view of Tal (US 4,975,969).

Regarding **claim 4**, Liang discloses all elements as mentioned above in claim 1. Liang further teaches wherein creating a drawing includes rendering the facial image into a set of points (Liang: figure 3). Liang does not teach wherein at least some of the points describe at least some of the facial feature and wherein at least some distances between the points represent at least one relationship among facial feature.

Tal teaches wherein at least some of the points describe at least some of the facial feature and wherein at least some distances between the points represent at least one relationship among facial feature (col. 3, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to represent at least one relationship from the distances as suggested by Jaakkola, to accurately distinguish one user from the next in order to increase the reliability of the exaggerations.

12. **Claims 18, 30, 31, 33, 34, 41** are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al (IEEE, "Example-based Caricature Generation with Exaggeration") in view of Massarsky (US 6,385,628 B1).

Regarding **claim 18**, Liang discloses all elements as mentioned above in claim 1. Liang does not teach wherein the degree of the exaggerating is selectable by a user.

Massarsky teaches wherein the degree of the exaggerating is selectable by a user (Massarsky: col. 2, lines 30-35).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to allow the user to select the degree of exaggeration as suggested by Massarsky, to modify the parameters in order for the end-product image to be customized for the user.

Regarding **claim 30**, Liang teaches a first area to depict a facial image; a second area to depict variably exaggerated facial features and relationships among the facial features of the facial image; a third area to depict a caricature of the facial image (Liang: figure 11); and a variable exaggeration controller to control a degree of variable exaggeration applied to one or

more facial features and relationships in the facial image (Liang: section 3). Liang does not teach a display area.

Massarsky teaches a display area (Massarsky: figure 2a, 18a).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to display the facial image, exaggerated facial features, and caricature as suggested by Massarsky, to allow the user to visually see the transformation of the user's image before and after caricature processing.

Regarding **claim 31**, Liang teaches first, second, and third display areas are shown simultaneously (Liang: figure 11).

Regarding **claims 33 and 34**, Liang discloses all elements as mentioned above in claim 30. Liang does not teach manually adjusting a size of a single feature or relationship and manually changing a shape of a facial feature in one of the display windows.

Massarsky teaches manually adjusting a size of a single feature or relationship (Massarsky: col. 2, lines 30-36) and manually changing a shape of a facial feature in one of the display windows (Massarsky: col. 2, lines 30-36).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to manually adjust as suggested by Massarsky, to allow the user to customize the caricature to the user's preference.

Regarding **claim 41**, Liang discloses all elements as mentioned above in claim 35. Liang further teaches constraining the exaggerating in order to maintain the facial image within a range of probable faces (Liang: section 4). Liang does not teach allowing a user to vary a degree of the exaggerating to be applied to a relationship among facial features.

Massarsky teaches allowing a user to vary a degree of the exaggerating to be applied to a relationship among facial features (Massarsky: col. 2, lines 30-35).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to allow the user to select the degree of exaggeration as suggested by Massarsky, to modify the parameters in order for the end-product image to be customized for the user.

13. **Claim 32** is rejected under 35 U.S.C. 103(a) as being unpatentable over Liang et al (IEEE, "Example-based Caricature Generation with Exaggeration") in view of Harville et al (US 7,149,961 B2).

Regarding **claim 32**, Liang discloses all elements as mentioned above in claim 1. Liang does not teach a selectable list of facial features and relationships to be selected for variable exaggeration.

Harville teaches a selectable list of facial features and relationships to be selected for variable exaggeration ("user-selectable parameters"; Harville: col. 29, lines 46-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Liang reference to utilize a selectable list as suggested by Harville, to allow the user to customize the type of caricature that the user prefers to create.

### *Conclusion*

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward Park whose telephone number is (571) 270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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